

ANALYTICAL SCANNING EVANESCENT MICROWAVE MICROSCOPE AND CONTROL STAGE

Abstract

5 A scanning evanescent microwave microscope (SEMM) that uses near-field
evanescent electromagnetic waves to probe sample properties is disclosed. The SEMM is
capable of high resolution imaging and quantitative measurements of the electrical
properties of the sample. The SEMM has the ability to map dielectric constant, loss
10 tangent , conductivity, electrical impedance, and other electrical parameters of materials.
Such properties are then used to provide distance control over a wide range, from to
microns to nanometers , over dielectric and conductive samples for a scanned evanescent
microwave probe, which enable quantitative non-contact and submicron spatial resolution
topographic and electrical impedance profiling of dielectric, nonlinear dielectric and
15 conductive materials. The invention also allows quantitative estimation of microwave
impedance using signals obtained by the scanned evanescent microwave probe and
quasistatic approximation modeling. The SEMM can be used to measure electrical
properties of both dielectric and electrically conducting materials.

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